

SOME ASPECTS OF RESPONDING ON EXTRAORDINARY SITUATIONS ON WATER OBJECTS WITH THE AIM THEIR PREVENTIONS OR MINIMIZING THEIR HARM ON THE EXAMPLE OF TRANSCARPATHIAN (ZAKARPATIE) REGION

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Abstract: Economical development of territories leads to increasing a pressure on nature and in its turn promotes increasing a frequency and scales of dangerous hydrometeorological phenomena including floods. That is why the problems connected with integrated flood protection have a great importance nowadays. Together with long terminated programs on protection highly populated areas with developed infrastructure a functional department system within frames of the National State System for response on extraordinary situations and prevention them was worked out in State Committee for Water Management. Due to a complex of developed measures including monitoring on water objects it succeeded to minimize losses from flood in 2001 in Transcarpathian region.

Keywords: hydrometeorological phenomena, hydrotechnical systems, river basin, flood, run-off, flood protection.

EINIGE ASPEKTE DER REAGIERUNG AUF DIE AUSSERORDENTLICHEN SITUATIONEN AUF DEN WASSEROBJEKTEN MIT DEM ZIEL DEREN VORBEUGUNG ODER MINIMISIERUNG DEREN SCHADEN AUF DEM BEISPIEL VON DER TRANSKARPATIE REGION (SAKARPATJA)

Zusammenfassung: Die ökonomische Entwicklung von den Territorien führt zur Vergrößerung der Einwirkungen auf die Natur, was in ihrer Linie die Vergrößerung der Frequenz und das Ausmaß der gefährlichen hydrometeorologischen Erscheinungen fördert, einschließlich die Hochwasser. Aus diesem Grunde gewinnen die mit den in Bezug auf den Schutz gegen Hochwasser verbundenen Komplexmaßnahmen eine wichtige Bedeutung zur Zeit. Zusammen mit den langfristigen Programmen zum Schutz der dichtbewohnten Territorien mit der Entwicklung der Infrastruktur von den Hochwassern, wurde das funktionale Amtssystem im Rahmen des Staatssystems zur Reagierung mit Rücksicht auf die außerordentlichen Situationen und deren Vorbeugung im Staatlichen Komitee zu Fragen der Wasserwirtschaft ausgearbeitet. Dank dem Komplex von den Maßnahmen, einschließlich das Monitoring auf den Wasserobjekten, war es gelungen die Verluste durch das Hochwasser im Jahre 2001 in den Transkarpatien (Sakarpatja) zu minimisieren.

Schlüsselworte: Hydrometeorologische Erscheinungen, hydrotechnische Systeme, Flußwasserbecken, Hochwasser, Wasserablauf, Hochwasserschutz (Gegenhochflutabsicherung)

Impact of human activity on the environment increases year by year which connected with land reclamation, a development of industry and agriculture. Pressure on nature in its turn has a negative effect that can be seen as direct and indirect way. Some results of a human activity adversely affect nowadays on the climate changing, run-off redistribution, characteristics of stretching cover and many others.

During the last 10 years frequency of floods, debris-flows, avalanches and other dangerous natural phenomena increased. This exposure can be illustrated on the example of Transcarpathian region.

The Tisa river is one of the largest tributary of the Danube river with the basin area about 11,300 km² within Ukrainian territory, that comes to 7% of total area (the total Tisa-basin area is about 153,000 km²). There are more than 9,000 rivers with total length about 19,000 km there (Palamarchuk 2001).

The drainage density is great enough (1,7 km/km²). Run-off of many rivers is regulated. There are 9 reservoirs and 59 ponds within the Tisa basin on the Ukrainian area. The total volume of artificial reservoirs is about 60,5 mln.m³. 8 from 9 reservoirs have integrated objections – for fishery and season regulation of run-off. Four reservoirs of irrigations system “Chorniy Mochar” accumulate flood run –off (6,5 mln. m³) and spring flood water (18,6 mln. m³) to smooth a top of a flood wave. The largest reservoir of the Tereblya-Rika GES has a regulative function for producing energy and hasn't great influence on a floodwater transformation.

For about a century people have been studying problems linked with dangerous natural hydrometeorological phenomena in this region. Great floods according data of Hydrometeorological institute were recorded in 1700,1730, 1805,1864, 1887, 1900, 1911, 1926, 1933, 1941 and 1947 (Logvinov 1973). Exactly natural factors were the main reasons of them.

Floods in Transcarpathian region occur 4-5 times a year and have catastrophe character in the years of high water. During 1946-2001 more than 150 floods were noted in this region.

The intensive economical development, a land reclamation for agriculture, building including building on slops and in water-register zones, excessive felling of forests, cattle over pasture, rude breach conditions of protecting environment favoured increasing frequency of these phenomena and lead to a great damages from them.

Analyses of investigations demonstrated the direct connections floods with natural factors and human activity. The most important role belongs to hydrometeorological factors (climatic conditions, regime of precipitations, peculiarities of run-off) which together with geomorphological and morphometrical characteristics of river basins play important role in forming dangerous phenomena such as floods, debris flows, avalanches and land slides.

Narrow river beds with steep slops promote a forming of high water levels during floods and determine great speeds of water stream in the mountain region. It influences on increasing a transporting and destructive ability of water, which carries a lot of alluviums and rock material, rest of wood and other material from slopes. This material accumulates on the low parts of river beds blocking them and creates huge deposits that leads to growing water levels and flooding areas.

Floods as natural phenomena used to be a result of natural processes but nowadays the influence of human activity on these processes becomes more principal.

It is well known a regulative role of plant (forests) in transforming surface run-off to underground one. Nowadays its role decreases as the result of felling forests and extensive using of highland that led to soil and forest degradation and this way decreased and destroyed water regulative role of surface (stretching) cover. According data of forest investigation forestry in mountain region decrease twice from the beginning of the last century (from 98-95% to 55%) and 5 times in foothills (to 15-20%) and the top of forest line became lower to 150-200 m and composition of plants changed a lot and became poor (Golubets 2001). Only during 1990-1996 more than 60 000 hectares of forests that make up 1/7 of total forestry fond in Transcarpathian region were cut down and it changed cardinally water regulative and water protective role of forests and conditions flood run-off formation.

Together with natural factors increasing role of human activity called forth great floods in 1957, 1974,1978,1979,1992,1993,1995,1998, 2001 some of them were accompanied with landslides and debris flows.

Taking into account that the territory of Transcarpathian region is highly populated with well-developed infrastructure (settlements, with industrial, agricultural, and transport facilities) the main problem is to protect this area from floods and minimize harm from them. With this aim the system of flood protection was created. More than 140 towns and villages in lowlands and along river beds with area more than 110 thousand hectare are protected and with its help accumulation and drain of floods run-off on the area 82,6 thousand hectare is realized in the Transcarpathian area.

Nevertheless problems of integrated protection of this area have a great importance nowadays.

Only in recent years, losses caused by floods made a great harm to economy.

The last high floods, which took place in 1998 and 2001 in the highlands of the Tisa basin, were estimated as catastrophical by specialists according the scale of their damages (810 and 250 mln. grn correspondingly) and areas they occupied. Some dams were destroyed in the mountain part of the catchments and flood levels on the lowlands reached limiting marks on protecting dams.

With the aim to minimize damages from floods, improve system of flood protection State Committee on Water Management worked out the Integrated Chimes on floods protection.

The SCWM inculcates a geoinformational system on control situation on water objects, worked out integrated program on protection settlements and territories from damages of water in Ukraine in 2001-2005 till 2010, a program of integrated protection in the Tisa basin in Zakarpatska oblast (region) in 2002-2006 and till 2015, realizes programs AIBC "Tisa" for flood forecast and monitoring on hydrotechnical systems and water objects.

Taking into account that a reliable protection from destructive water force is one of the most important and difficult water-economical problems State Committee for Water Management worked out a program for prevention extraordinary situations on water objects which deals with floods and floating of ice, pollutions and others, within a frame of national program on response on extraordinary situations and their prevention (Instruction 2001).

The functional department system (FDS) of State Committee for Water Management of Ukraine as a component of the National State System (NSS) for response on extraordinary situations determines main tasks, their fulfillment, and coordination action of all sub-structural departments of Committee.

The FDS is an integral part of the NSS, which was created on the base of the SCWM of Ukraine and includes all its river basin departments (4), regional departments (24), departments for management canals (5), local sub-departments, operational departments and other organizations which realize monitoring on water objects with the aim to secure stable functioning water-economy complexes and systems and realizing measures for prevention damages, catastrophes and extraordinary situations connected with admission floods, possible damages on hydrotechnical constructions which can lead to flood and pollution on areas with its population and infrastructure.

Main tasks of this system are:

- Working out normative documents, rules and standards on prevention extraordinary situations on water objects to protect population and territory from damages;
- To make ready all department to realize program on prevention extraordinary situations and minimizing their damages;
- Training water-economy personal and to educate local population as for behavior during extraordinary situations;
- Working out special scientific and technical programs to prevent extraordinary situations and guarantee stable function of hydrotechnical systems and organizations to minimize damage;
- Creating efficient preservation and using material recourses;
- Accumulation and analyzing information as for hydrometeorological and water-economy situations on water objects. Informing local citizens about potential possibility of appearing extraordinary situations and about real situation in the region and also about precautionary measures, which are realized;
- Fulfillment urgent works to eliminate extraordinary situations;
- Minimizing possible fatal consequences;
- Participation in international cooperation with transboundary countries on water resources.

The Center of crisis situation on water objects is at the head of the FDS activity and coordinates a sphere of action on four levels: state, regional, local and object.

Taking into account that flood activity depends on conditions of river basins the main efforts should be directed on regulation of surface run-off by accumulation it and for prolongation its flowing in time.

The SCWM have worked out departmental norms (standards) in accordance with requirements of Water Code (Law) of Ukraine which regulate an activity organizations of the SCWM on monitoring river basins including river beds, slopes and water-protective zones as well as a monitoring on hydrotechnical systems and constructions (Instruction, Mountain rivers 2001).

Thanks to complex measures, which were realized including monitoring on water objects it succeeded to minimize losses from flood. Indicated in this connection floods in 1998 and 2001 which evaluated by specialists like the same as for hydrological characteristics but due to undertaken steps a top of the flood wave was smooth away that help to miniaturize damages from flood in 2001 in 2,5 times.

The problem of flood protection in Transcarpathian region has an international character and its solving requires integration of material, financial and intellectual resources of all countries in this region.

The SCWM realizes programs together with specialists of neighbour countries (Hungary, Slovak, Rumania and others) and with non-government organizations (TACIS, NATO, DANTEE) on projects of flood protection management within the Tisa basin.

Integrated measures are directed on realization national policy on protection populations and territories from extraordinary situation of technical and natural origin, preventing them and fulfillment an operative reaction on them.

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